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properties of this wonderful substance, light, which animates all nature in the eyes of man, and perhaps above all things disposes him to acknowledge the Creator's bounty. But want of leisure obliges me to quit the subject for the present.

I am, dear sir, your affectionate friend,

And very humble servant,

DAVID RITTENHOUSE.

N^o XXV.

An Enquiry into the Cause of the Increase of Bilious and Intermitting Fevers in Pennsylvania, with Hints for preventing them. By BENJAMIN RUSH, M. D. Professor of Chemistry in the University of Pennsylvania.

Read December
16, 1785.

IT has been remarked, that Pennsylvania for some years past has become more sickly than formerly. Fevers which a few years ago appeared chiefly on the banks of creeks and rivers, and in the neighbourhood of mill-ponds, now appear in parts remote from them all, and in the highest situations. This change with respect to the healthiness of our country, may be traced to the three following causes.

1. The establishment and increase of mill-ponds. There are whole counties in Pennsylvania in which intermittents were unknown, until the waters in them were dammed, for the purpose of erecting mill-ponds.

2. The cutting down of wood, under certain circumstances, tends to render a country sickly. It has been remarked that intermittents on the shores of the Susquehanna have kept an exact pace with the passages which have been opened for the propagation of marsh effluvia, by
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cutting down the wood which formerly grew in its neighbourhood. I remember the time, when intermittents were known only within half a mile, in some places, of that river. They are now to be met with ten miles from it in the same parts of the state.

I beg a distinction to be made here between *clearing* and *cultivating* a country. While clearing a country makes it sickly in the manner that has been mentioned, *cultivating* a country, that is, draining swamps, destroying weeds, burning brush, and exhaling the unwholesome or superfluous moisture of the earth, by means of frequent crops of grain, grasses, and vegetables of all kinds, render it healthy. I could mention, in support of these facts, several countries in the United States, which have passed through each of the stages that have been described. The first settlers received these countries from the hands of nature pure and healthy*. Fevers soon followed their improvements, nor were they finally banished, until the higher degrees of cultivation that have been named took place. I confine myself to those countries only where the salutary effects of cultivation were not rendered abortive by the neighbourhood of mill-ponds.

A 3d cause of the late increase of bilious and intermitting fevers, must be sought for in the different and unequal quantities of rain which have fallen within these last seven years. While our creeks and rivers, from the uniformity of our seasons, were confined to steady bounds, there was little or no exhalation of febrile miasmata from their shores. But the dry summers of 1780, 1781, and 1782, by reducing our creeks and rivers far below their ancient marks; while the wet springs of 1784 and 1785, by swelling them both beyond their natural heights, have, when they have fallen, as in the former case, left a large

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* A physician who travelled through part of Bedford county, in Pennsylvania, in the year 1782, informed me that he was witness of some country people having travelled twenty miles, to see whether it was possible for a German girl who laboured under an intermittent, to be hot and cold at the same time.

and extensive surface of moist ground exposed to the action of the sun, and of course to the generation and exhalation of febrile miasmata. The history of epidemics in foreign countries, favours this opinion of the cause of their increase in Pennsylvania. The inhabitants of Egypt are always healthy during the overflowing of the Nile. Their fevers appear only after the recess of the river. It is remarkable that a wet season is often healthy in low, while it is sickly in hilly countries. The reason is obvious. In the former the rains entirely cover all the moist grounds, while in the latter, they fall only in a sufficient quantity to produce those degrees of moisture which favour febrile exhalations. The rains which fall in the summer are rendered harmless only by covering the *whole* surface of marshy ground. The rains which fall in our state after the middle of September, are so far from producing fevers, that they generally prevent them. The extraordinary healthiness of the last autumn, I believe was occasioned by nothing but the extraordinary quantity of rain that fell during the autumnal months. The rain probably acts at this season by diluting, and thus destroying, the febrile miasmata that were produced by the heat and moisture of the preceding summer. In support of the truth of this third cause of the increase of fevers in Pennsylvania, I have only to add a fact lately communicated to me by Dr. Franklin. He informed me that in his journey from Passy to Havre de Grace, last summer, he found the country through which he travelled, unusually sickly with fevers. These fevers it was generally supposed, were produced by the extraordinary dry weather, of which the public papers have given us such melancholy and frequent accounts.

I come now to suggest a few hints for obviating and preventing fevers, and for rendering our country again healthy. For this purpose I beg leave to recommend in the first place, the planting of trees around all our mill-ponds, (besides cleaning them occasionally) in order to
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prevent the diseases that have justly been ascribed to them. Let the trees be planted in the greatest number, and closest together, to leeward of the ordinary current of the summer and autumnal winds. I have known several instances of families being preserved from fevers by an accidental copse of wood standing between a mill-pond and a dwelling house, and that in cases too where the house derived no advantage from an high situation. The trees *around* or *near* a mill-pond, act perhaps in a small degree *mechanically*. By sheltering the pond from the action of the sun, they lessen exhalation, as well as obstruct the passage of the vapors that are raised to the adjacent parts. But they act likewise *chemically*. It has been demonstrated that trees absorb unhealthy air, and discharge it in a highly purified state in the form of what is now called "de-flogisticated" air. The willow tree, according to Mr. Ingenhauz, has been found to purify air the most rapidly of any tree that he subjected to his experiments. The rapidity of its growth, its early verdure, and the late fall of its leaf, all seem to mark it likewise as a tree highly proper for this purpose.

A second method of preventing fevers, is to let the cultivation always keep pace with the *clearing* of our lands. Nature has in this instance connected our duty, interest and health together. Let every spot covered with moisture from which the wood has been cut, be carefully drained, and afterwards ploughed and sowed with grass seed; let weeds of all kinds be destroyed, and let the waters be so directed as to prevent their stagnating in any part of their course.

These are the two principal means of extirpating intermitting and bilious fevers from our country, but as these means are slow in their operation, I shall subjoin a few directions for preventing fevers till the above remedies can take effect.

1. Whether the matter which produces fevers be of an organic, or inorganic nature, I do not pretend to determine, but it is certain, that *fire* or the *smoke* or *heat*, which issue from it, destroy the effects of marsh miasmata upon the human body; hence we find cities more healthy than country places, and the centre of cities more healthy than their suburbs in the sickly months. To derive the utmost possible benefit from this method of preventing sickness, I would advise large fires to be made every evening of brush between the spots from whence the exhalations are derived, and the dwelling house, and as near to the latter as is safe, and not disagreeable. This practice should be continued till the appearance of two or three frosts, for frosts as well as heavy rains in the autumnal months never fail to put a stop to the progress of intermittents.

During the sickly season, fires should be likewise kept in every room in the dwelling house, even in those cases where the heat of the weather makes it necessary to keep the doors and windows open.

2. Let me advise my countrymen in sickly situations, to prefer woolen and cotton to linen clothes in the summer and autumnal months. The most sickly parts of the island of Jamaica have been rendered more healthy, since the inhabitants have adopted the use of woolen and cotton garments instead of linen.

During the late war, I knew many officers both in the British and American armies who escaped fevers in the most sickly places, by wearing woolen shirts, or waistcoats constantly next to their skins. I have heard the present diminution of the human body in strength and size, compared with its ancient vigor and form, ascribed in part to the introduction of linen garments. I am not disposed to controvert this opinion, but I am sure of the efficacy of woolen clothes in wet and cold climates in preventing fevers of all kinds. The parliament of Great Britain

Britain compel every body that dies within the island to be buried in a woolen shirt or winding sheet. The law would be much wiser if it compelled every body to wear woolen garments next their skins during life, and linen after death.

3. The diet in the sickly months should be generous. Wine and beer should be the drinks of this season instead of spirits and water. I do not think that fruit and vegetables of any kind produce fevers, but as the season of the year produces languor and weakness, a larger quantity of animal food than usual is best calculated to oppose them. Salted meat for this reason is preferable to fresh meat. Food of all kinds eaten during the sickly months should be well seasoned.

4. The evening air should be avoided as much as possible. There are at present few places in Pennsylvania where it is safe to sleep, or even to sit, after the going down of the sun, in the sickly months, with the windows open. The morning air before the sun rises, should not be breathed, until the body has been fortified with a little solid aliment, or a *draught* of bitters. These bitters should be made of centaury, wormwood, camomile, or the bark of the willow or dogwood trees, infused in *water*. Bitters made with spirits, or even wine, cannot be taken in a sufficient quantity to do service, without producing intoxication, or the deadly habit of loving and drinking spirituous liquors.

5. Too much cannot be said in favour of cleanliness, as a means of preventing fevers. The body should be bathed or washed frequently. It has been proved that in the highlands of Jamaica adding salt to water, renders it more powerful in preventing diseases when applied to the body. Equal pains should be taken to promote cleanliness in every species of apparel. Offal matters, especially those which are of a vegetable nature, should be removed from the neighbourhood of a dwelling house. The dung of domestic animals during its progress towards manure
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may be excepted from this direction. Nature, which made man and these animals, equally necessary to each other's subsistence, has kindly prevented any inconvenience from their living together. On the contrary, to repay the husbandman for affording a shelter to these useful and helpless animals, nature has done more. She has endowed their dung with a power of destroying the effects of marsh exhalations, and of preventing fevers. The miserable cottagers in Europe who live under the same roof, and in some instances in the same room with their cattle, are always healthy. In Philadelphia, fevers are less known in the neighbourhood of livery stables, than in any other part of the city. I could mention a family that has lived near thirty years near a livery stable in a sickly part of the city, that has never known a fever but from the measles or small-pox.

N° XXVI.

An Account of the late Dr. HUGH MARTIN's Cancer Powder, with brief Observations on Cancers. By BENJAMIN RUSH, M. D. &c. &c.

Read February
3, 1786.

A FEW years ago a certain Dr. Hugh Martin, a surgeon of one of the Pennsylvania regiments stationed at fort Pitt, during the latter part of the late war, came to this city, and advertised to cure cancers with a medicine which he said he had discovered in the woods, in the neighbourhood of the garrison. As Dr. Martin had once been a pupil of mine, I took the liberty of waiting upon him, and asked him some questions respecting his discovery. His answers were calculated to make me believe, that his medicine was of a vegetable nature, and that it was originally an Indian remedy. He shewed